

Newsletter

Volume 11, Number 3
May - June 1994

Editor's Note

In January, the Australian Minister for Science announced that Dr. Gene Likens had been selected to receive the 1994 Australia Prize in the field of sustainable land management. The Australian announcement noted Dr. Likens' influence on the way scientists around the world study ecosystems, bringing gradual understanding to the enormous complexity of these systems. It also singled out Dr. Likens' unwavering commitment to present and to defend his research findings even when they aroused the ire of industrialists, politicians or even environmentalists.

This is the first time that the Australia Prize has been awarded to a single individual. We at the Institute are extremely proud of Dr. Likens, both for the dedication and hard work that earned him this important award and for the competence and style with which he guides the Institute.

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Gene E. Likens, Director
Joseph S. Warner, Administrator
Alan R. Berkowitz, Head of Education

Editor: Jill Cadwallader
Printing: Central Press

INSTITUTE OF ECOSYSTEM STUDIES
Education Program
Box R (Route 44A)
Millbrook, NY 12545-0178
(914) 677-5359

Dr. Likens Wins 1994 Australia Prize

Thirty-one years ago, Dr. Gene E. Likens and colleagues initiated the Hubbard Brook Ecosystem Study in the White Mountains of New Hampshire.* Research at Hubbard Brook is ongoing, bringing a wealth of critical environmental knowledge, a far greater understanding of nature's intricate relationships ... and, to-date, close to 1300 scientific publications. As a result of his pioneering work at Hubbard Brook and at Mirror Lake, and for founding the Institute of Ecosystem Studies, Dr. Likens, director of the Institute, recently won the 1994 Australia Prize for outstanding achievement in the field of sustainable land management.

The Australia Prize is an international award sponsored by the Australian Government for outstanding achievement in science and technology promoting human welfare. Each year a different scientific field is chosen; while sustainable land management was the area this year, the 1995 prize will be for work in remote sensing. The winner is selected by a committee made up of the presidents and several fellows of the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering, as well as other

distinguished Australians nominated by the minister for science. In past years the prize has been awarded to Australians, or to international teams that included an Australian scientist. This is the first time that a non-Australian has been the sole recipient.

The Australia Prize was presented at a formal dinner held at Parliament House in Canberra on 27 April. Following the meal, the approximately 300 guests were given a video introduction to the Australia Prize and to Dr. Likens at work at Hubbard Brook. (The tape was made by Quantum, Australian Broadcasting Corporation, in March, and snowmobiles were used to get cameras, interviewers and researchers into the New Hampshire forests.) Senator Peter Cook, the Australian Minister for Industry, Science and Technology, spoke about Dr. Likens' contributions to science, including the documentation of acid rain and his recommendations on sustainable forestry, and then presented the Australia Prize. For the award ceremony, Dr. Likens and his wife Phyllis Likens were joined by their family, making the event even more memorable for Dr. Likens.

Coverage by the Australian media was extensive, with many press conferences and radio and television interviews scheduled in the days preceding and following the

continued on page 2

* *The Hubbard Brook Ecosystem Study was the cover story of the July-August 1993 issue of the IES Newsletter (Volume 10 Number 4).*



Dr. Gene Likens and Mrs. Phyllis Likens with Dr. Bill Williams, an internationally known limnologist from the University of Adelaide, Australia who was one of the nominators of Dr. Likens for the 1994 Australia Prize.

The Plasticity of Tadpoles

They say truth is stranger than fiction. While doing his doctoral thesis research on the population dynamics of dragonflies at Duke University in North Carolina, Dr. Josh Van Buskirk discovered an intriguing live demonstration of this saying. He noticed that gray tree frog tadpoles in some ponds had small bodies and deep, bright red or orange tails and inactive behavior, while the same species maturing in other ponds had large, round bodies with relatively small, drab-colored tails and an active feeding behavior. What could cause such tremendous differences in the appearance and activity of the same species of tadpoles? After further observation and study he found that the former lived in ponds in which there were predatory dragonfly larvae, whereas the latter lived in ponds free of predators. The mere presence of predators affected tadpole development.

Scientists do not know how this phenomenon, called plasticity, happens, but plasticity in appearance is common with many plants and animals. Dr. Van Buskirk became interested in learning more about plasticity in tadpoles ... how the phenotype — structure, color and behavior — of these animals changes depending on their environment. When he became a post-doctoral associate at the Institute of Ecosystem Studies in September 1992 he continued his earlier field studies.

What was the evolutionary advantage of plasticity in gray tree frog tadpoles? Dr. Van Buskirk found that tadpoles with the deep, brightly-lobed tailfin have, on average, a 15% higher survival rate when exposed to dragonfly larvae than do tadpoles from ponds with no predators. That is, the tadpoles' plastic response to nearby predators helps them evade those same predators. In the absence of dragonfly larvae, however, the plain-colored tadpoles fare better by 10% than do their deep-tailed counterparts, which must die from other causes in greater numbers than do tadpoles

of the drab phenotype. Survival in an unpredictable environment, then, is a key benefit of the plastic phenotype.

Currently, Dr. Van Buskirk is investigating the consequences of plasticity for the organization of pond communities. He is experimentally generating a range of phenotypes of several different species, then introducing them into ponds together, to observe how the combinations of phenotypes affect ecological relationships.

He is excited especially about an upcoming project in which he will be sampling a number of different ponds, recording every possible detail about frogs' environments — where different species are found, the types of predators that are present, and what the ponds themselves are like biologically, chemically and physically. These data will enable him to determine the relationships between pond types and tadpole phenotypes. Also, by creating pond environments that differ in such parameters as food availability and predator presence, Dr. Van Buskirk will be able to manipulate tadpole behavior and morphology independently, to learn how the two interact to affect reactions to predators. His conclusions will contribute to knowledge about community ecology and enable predictions of ecological distributions based on morphology.

* * * * *

Dr. Van Buskirk will be doing summer field work at Isle Royale in northern Michigan before moving to the University of Michigan for a year to join a recently-



Dr. Josh Van Buskirk's research has been with gray treefrog tadpoles in North Carolina and Michigan, but the animals also live in the Northeast. Posing with Dr. Van Buskirk is an adult gray treefrog that lives in the IES Perennial Garden.

funded study of the ecological consequences of phenotypic plasticity in amphibians. From there he will take a permanent faculty position at Texas Tech University in Lubbock, Texas.

During his postdoctoral stay at the Institute, Dr. Van Buskirk also has collaborated with IES animal ecologist Dr. Richard Ostfeld on studies of the ecology of the deer tick. Their work will be the subject of an article in an upcoming issue of the IES Newsletter.

Australia Prize, *from page 1*

presentation. During their three-week stay, Dr. and Mrs. Likens had an extremely full agenda. Escorted to Adelaide, Melbourne, Perth, Fremantle and Sydney, they toured major environmental and industrial sites and academic institutions. On one occasion, Dr. Likens gave three lectures in a single day. During a free day, Dr. and Mrs. Likens took a ferry to Rottnest Island in the Indian Ocean off Perth where they saw "quokkas", rat-sized relatives of kangaroos that live only there (and which, mistaken for rats by Dutch explorers, gave the island its name).

Back at IES in mid-May, Dr. Likens soon will be returning to Hubbard Brook to do his research. As he does each summer, he will spend approximately six weeks working with his graduate students, postdoctoral associates, research assistants and colleagues, and collecting more data on his own long-term projects.

IES Ecology Day Camp

**Outdoor summer fun for
children ages 6-12**

One-week sessions begin on
July 5, 11, 18 and 25, &
August 1, 8 and 15.

Spaces remain in most sessions.
Call 914/677-5359

IES "Best Project" Award

Ms. Tamara Keller, a 10th grader at Roy C. Ketchum High School in Wappingers Falls, N.Y., is this year's recipient of the Institute of Ecosystem Studies' award for "Best Project in Environmental Science and Ecology" at the 1994 Dutchess County Regional Science Fair. Ms. Keller's project dealt with the effects of certain potentially toxic materials and known pollutants on the heart rate of *Daphnia pulex*, a tiny freshwater crustacean commonly called the water flea.

The external skeleton of *Daphnia* is essentially transparent, so Ms. Keller was able to count the heartbeat by watching each animal through a low power magnifying lens. Under normal conditions, the average was 200 beats/minute. In her study, which included a control group of 20 untreated animals, she measured the animals' heart rates before and immediately after exposing them to orange soda, detergent, kerosene and anti-freeze, and thereafter at 24 hour intervals.

Her data showed that while all the materials acted as depressants, the orange soda was the least toxic, followed by anti-freeze, then kerosene, with detergent being the most toxic. At the heaviest concentrations of toxic material, *Daphnia* heart rates dropped to 40 beats/minute.

Among the Institute scientists serving as judges at the Dutchess County Regional Science Fair, Drs. Alan Berkowitz, Gary Lovett, Richard Ostfeld, Josh Van Buskirk and Kathleen Weathers had the responsibility of evaluating each entry for eligibility for the IES award. Dr. Berkowitz said that Ms. Keller "approached the question in a systematic fashion, and (her experiment was) well controlled, well-replicated and well-executed", thereby satisfying the judges' requirements. In May, Ms. Keller and her parents attended a ceremony at the Institute, where Director Dr. Gene Likens presented her with a Certificate of Recognition and a \$50 award.

Ms. Keller's project also received an Honorable Mention at the Dutchess County Regional Science Fair and a number of other prizes including a High Honors Medal



TOM TAFT

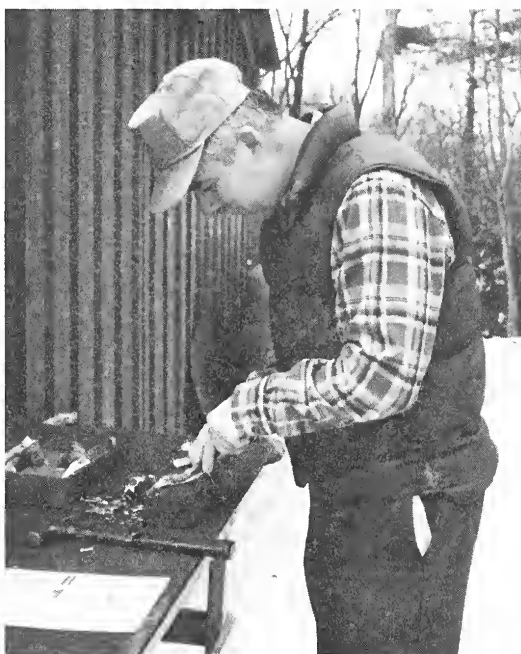
from the Southeastern Section Science Congress. This, in turn, qualified her for a statewide science competition held early in June at the State University of New York in New Paltz, and there she received an Honors Medal naming her as one of the top 26 science students in New York state.

Winter Deer Mortality Survey

How did the harsh winter of 1993-94 affect the local white-tailed deer population? With access to food supplies limited and movement restricted in deep snow, was mortality affected?

Mr. Raymond Winchcombe, manager of field research facilities and a wildlife biologist at the Institute, did a field survey to answer these questions, and from 1 January through 15 April 1994 examined 32 deer carcasses found on IES property and adjacent roadways. Six of the deer were roadkills, and thus were excluded from the mortality data.

The condition of bone marrow, specifically its fat content, is a reliable indicator of malnutrition in deer, and remains so even if the animal has been dead for some time. Mr. Winchcombe examined the bone marrow in a femur — the large bone in the upper hind leg — from each of the 26 remaining animals. By comparing the marrow's color and texture to illustrations on a chart from the New York State Department of Environmental Conservation, he was able to



JILL CADWALLADER

At the IES field laboratory, Mr. Raymond Winchcombe extracts bone marrow from the femur of a whitetailed deer. By comparing the marrow with illustrations on the chart in the foreground, he can determine whether the animal died from starvation.

determine that only two of the animals, both female fawns, had died of starvation and that a third female fawn was close to starvation when it was killed by a predator.

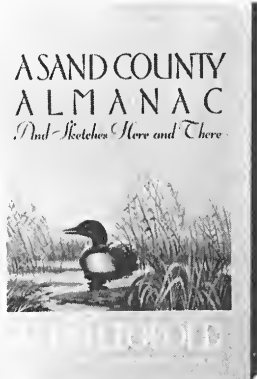
Predation, most likely by coyotes, was the greatest cause of deer mortality, and, in fact, this was the first time that Mr. Winchcombe had seen predation to such an extent on Institute property. All but one of the 18 predator kills had a femur marrow fat content rated good to excellent, suggesting that deep snow rather than a weakened condition made the deer easy to catch. Two of the remaining animals likely died from injuries related to hunting and the others from unknown causes. In his examination of bone marrow fat content, Mr. Winchcombe again found no indication of starvation.

Helping Mr. Winchcombe in the search for deer carcasses were IES volunteers Joe Crooker, John Dorney, Dave Wohlbach and Mike Fargione, Mr. Fargione's nephew Ralph Colomello, and Art Breslau, Mark Crittenden and Lisa Weinberg who are participants in the IES managed deer hunt.

The Aldo Leopold Society

Aldo Leopold (1887-1948) was an extraordinary man: wildlife ecologist, naturalist, conservationist, humanist, manager, and, above all, a gifted thinker, writer and teacher. His writings, including the well-known *A Sand County Almanac*, provide a clear link

between science and ethics, and between our understanding of ecosystems and actions we take that affect their health.



Central to the mission of the Institute of

Ecosystem Studies is the creation, dissemination and application of knowledge about ecological systems. A society with a basic understanding of ecological systems and an appreciation of their role in the quality of human life is essential if natural areas are to be preserved. This was Leopold's message and remains the Institute's commitment.

The Aldo Leopold Society offers those who share the values of Aldo Leopold and the commitment of the Institute of Ecosystem Studies the opportunity to contribute to the Institute's success and simultaneously be an integral part of it. Society members support research and education initiatives and, through invitation to private programs, will be among the first to learn about IES research discoveries and advances in education. For information call Ms. Jan Mittan at 914/677-5343.

Calendar

CONTINUING EDUCATION

Fliers describing these summer semester offerings are available from the Gifford House:

Landscape Design courses:

July 16: **Rapid Landscape Design**

July 23: **Landscape Design for the Small Residential Site - Extended**

Gardening courses:

July 19: **Attracting Birds and Butterflies to Your Garden**

July 23: **Field Course: Plant Pests and Other Problems**

July 27: **Waterscaping**

July 30: **Field Course: Growing with Organics**

Aug. 6: **Summer & Autumn Wildflower Gardening**

Aug. 20-21: **Fundamentals of Gardening**

Aug. 28: **Ornamental Grasses in the Garden**

Natural Science Illustration Courses:

July 11-15: **Colored Pencil Techniques**

July 11-15: **Drawing in the Garden**

Aug. 2-4: **Watercolors in the Garden**

Excursions:

July 21: **Great Mountain Forest Dynamics**

Aug. 19: **A Tour of Stonecrop**

The IES Continuing Education Program office has a new telephone number. Call 914/677-9643 for information on certificate programs or individual offerings, or to register.

SUNDAY ECOLOGY PROGRAMS

Free public programs are held on the first and third Sunday of each month, except over holiday weekends. Programs begin at 2 p.m. at the Gifford House on Route 44A unless otherwise noted. Programs for July and August were not finalized at press time, so call 914/677-5359 for information.

• *In case of poor weather, call 677-5358 after 1 p.m. to learn the status of the day's program. For outdoor programs, wear long pants tucked into socks and sturdy waterproof shoes.*

For general information, call the IES Education Program Office at the Gifford House Visitor and Education Center: 914/677-5359 weekdays from 8:30 - 4:30.

IES SEMINARS

The Institute's program of **scientific seminars** features presentations by visiting scientists. Beginning in mid-September, free seminars are held each Friday at 3:30 p.m. in the Plant Science Building.

GREENHOUSE

The IES greenhouse is a year-round tropical plant paradise as well as a site for controlled environmental research. The greenhouse is open until 4:00 p.m. daily except public holidays. Admission is by free permit from the Gifford House.

IES GIFT AND PLANT SHOP

Senior Citizens Days: On Wednesdays, senior citizens receive a 10% discount (except sale items).

HOURS

Summer hours: May 1 - September 30

Closed on public holidays.

Public attractions are open Mon. - Sat., 9 a.m. - 6 p.m. & Sun. 1 - 6 p.m. (**Note:** The Greenhouse and Plant Science Building close at 4 p.m.)

The **IES Gift and Plant Shop** is open Mon. - Sat., 11 a.m. - 5 p.m. & Sun. 1 - 5 p.m. (The shop is closed weekdays from 1 - 1:30 p.m.)

• *All visitors must pick up a free permit at the Gifford House Visitor and Education Center on Route 44A for access to IES public attractions. Permits are available until 5:00 p.m. daily.*

MEMBERSHIP

Become a member of the Institute of Ecosystem Studies. Benefits include a member's rate for IES courses and excursions, a 10% discount on Gift Shop purchases, a free subscription to the IES Newsletter, and participation in a reciprocal admissions program, with benefits at over 100 nature centers, forest preserves, gardens and conservatories in the U.S. and Canada. Individual membership is \$30; family membership is \$40. For information on memberships, call Ms. Janice Claiborne at 914/677-5343.

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Box R
Millbrook, New York 12545-0178



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